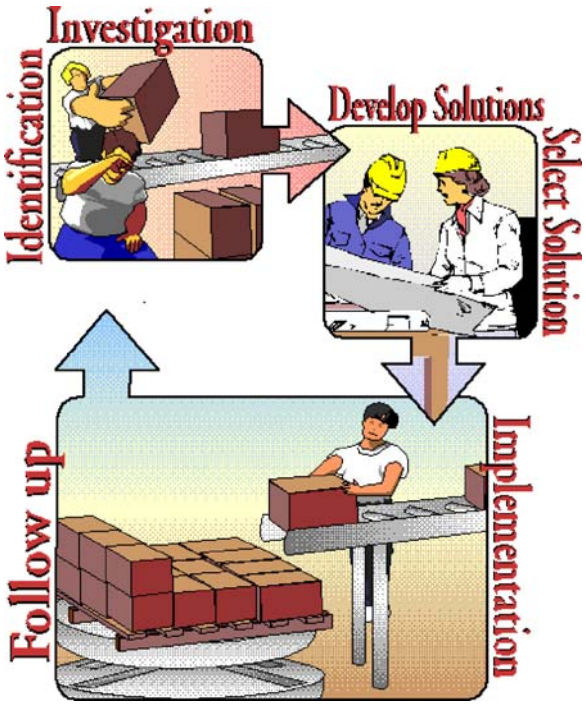
Boeing Enterprise Ergonomics System

Shop Evaluation tools

High & Moderate

Risk Surveys

Ergo Job Analyzer



Ergonomic Problem Solving

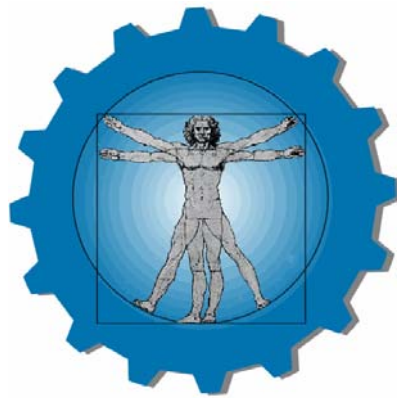
BOEING

Objectives

- Introduce new requirements
- Glimpse at the tools
- Solicit those who are willing to be trained:
  - Screener
  - Evaluator

PRO 1018 requirements

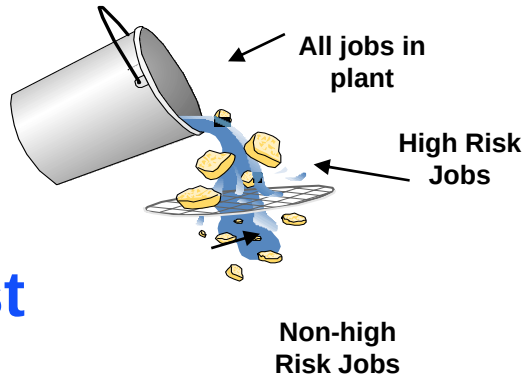
- **Annual awareness training**
- **Integrate ergonomics criteria into:**
  - New/modified process or work practices
  - Facilities
  - Tools, tooling, material handling, packaging
  - Equipment
  - Office workstations
  - New product design
  - Lean manufacturing



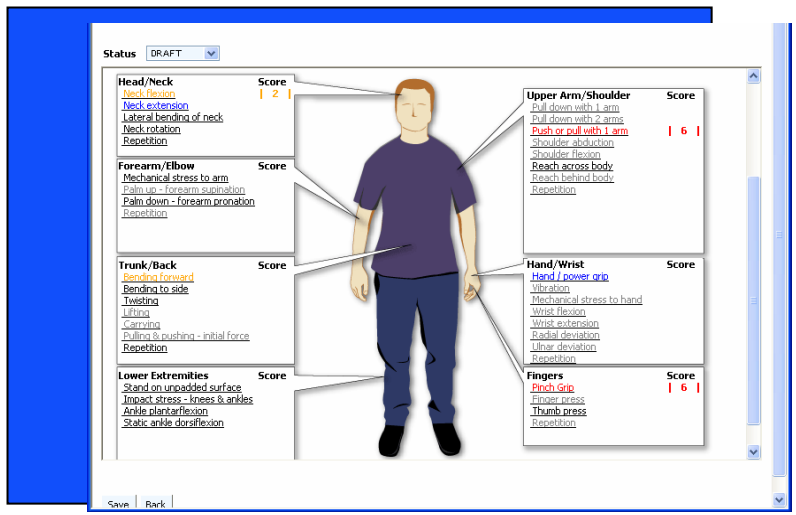
- **Standard office evaluations tools**
- **Standard shop evaluations tool**

Shop Ergonomics Assessment Tools Overview

- **Risk Surveys**
  - Trained screeners
  - Teams work to fix high priorities first

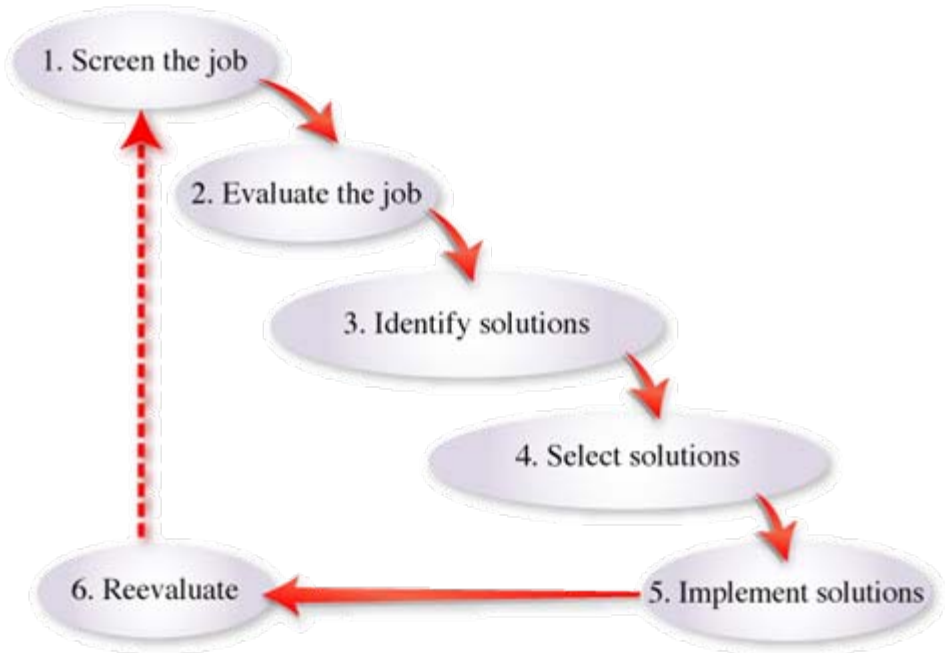


- **Greater depth analyses**
  - Trained evaluators
  - Evaluations and solutions
  - Risks prioritized
  - Measured effectiveness



Shop Ergonomics Software System Overview

- **Post solution implementation**
  - **Improvement is visible and quantified**
  - **Visibility across Enterprise**

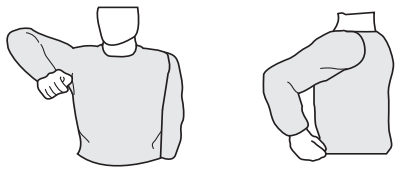


Screening tools
Course TR008223

Students learn:

- Basic principles of ergonomics
- Identify risks with Screening tools
- Use of simple evaluation equipment

High Risk Survey



- Elbow raised above shoulder
- Hand behind shoulder

Potential students:

- Safety focals
- Shop stewards
- Supervisors
- Team leaders
- Lean teams

Screening tools course:

- 4 hour course

Evaluation tools
Course TR008237

Students learn screening course materials plus how to:

- Use the software system
- Use an Ergo Problem-solving method
- Perform in-depth analysis
- Perform a re-evaluation of a job
- Use of more complex evaluation equipment

Potential students

- Safety administrators and professionals
- Ergonomics team members
- Industrial engineers
- Other shop floor change agents

Evaluation tools course

- 16 hour course

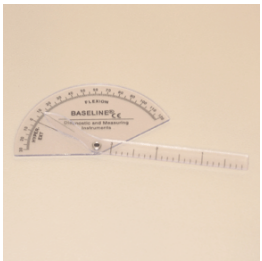
Summary

- Tools are in compliance with PRO 1018, Ergonomics.
- Valuable part of evaluating risks and sharing solutions across the Enterprise.
- Proactive initiative to avoid injuries/illnesses.
- Maximize productivity.
- Involve employees and managers.

You have an opportunity to be involved

Back Up Slides

Screening Equipment Kits

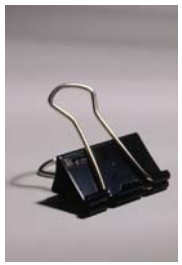


Angle-
Goniometer

Pull gauge

Stopwatch

Scale
Weights
Finger/thumb press
Push



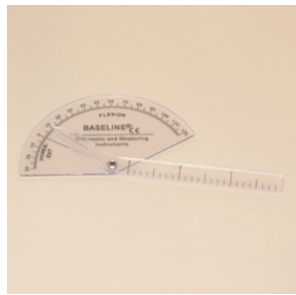
Go/no gauges for hand and pinch grip

Custom case or bag

- Kits cost approximately $125
- Paid by home organization
- Not every student needs a kit; they need access to a kit

Evaluation Equipment Kits

Dynamometers
Hand and pinch grip
Finger/thumb press



Goniometer – Angles

Tape Measure

Push/pull gauge
All push/pulls
Weight

Stopwatch

- Kits cost approximately $725
- Paid by home organization
- Not every student needs a kit; they need access to a kit

Custom case

High Risk Survey

High Risk Survey

Business Unit | **Site Name**
Location | **Floor** | **Rm/Clmn/Desc**

Boeing Department | **Job Code** | **Job Title**

Process Name
Shift | **Work Unit ID** | **Ergo Work Unit**
Duration (Mins) | **Work Description**

Screener BEMS ID | **Screener Email Address**
Shop Contact BEMS ID | **Shop Contact Email Address**

Risk Factor Score
Number Of Employees
Adjusted Risk Score
Total Score

Notes

Ergonomics Risk Factors	Yes/No	Daily Count	Comments
1. Hand grip force exceeds 50 pounds	☐		
2. Pinch grip force exceeds 12.5 pounds	☐		
3. Wrist fully bent in any direction	☐		
4. Palm turned face-up	☐		
5. Elbow raised above shoulder, or hand behind shoulder	☐		
Time spent overhead or behind shoulder: (Mins)			
6. Head fully bent toward torso while looking down, or looking directly overhead	☐		
Time spent looking down or directly overhead: (Mins)			

Ergonomics Risk Factors	Yes/No	Daily Count
7. Lift or carry more than 50 pounds	☐	
8. Push or pull with a force more than 60 pounds	☐	
9. Excessive repetitive motions at a single joint over a workday Fingers: 20,000 Hands: 6,500 Elbow/Forearm: 3,750 Shoulder: 900	☐	F H E S
10. Pulling down with both hands with a force greater than 85 pounds	☐	
11. One-handed push or pull with a force greater than 45 pounds	☐	
12. Pushing with fingers with a force greater than 20 pounds	☐	
13. Pushing with thumb with a force greater than 25 pounds	☐	
14. Using base of hand to pound (pounding using shaded region)	☐	
15. Concentrated force applied to a small surface area of the skin	☐	
16. While standing, torso bent forward more than 60 degrees for more than 10 sec. or while sitting, head or elbow in front of knees for more 10 sec.	☐	
		Duration
17. Time spent kneeling on a hard surface (Mins)	☐	
18. Time spent with knee flexed more than 70 degrees (Mins)	☐	
19. Time spent operating a vibrating tool (Mins)	☐	
20. Average workweek in the past month exceeded 60 hours	☐	

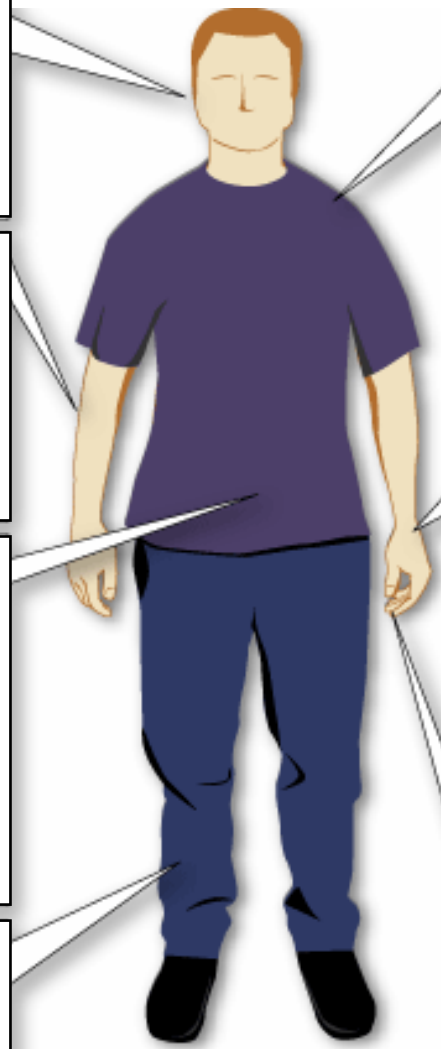
Ergo Job Analyzer (EJA) Categories

Head & Neck

Forearm & Elbow

Trunk & Back

Lower Extremities

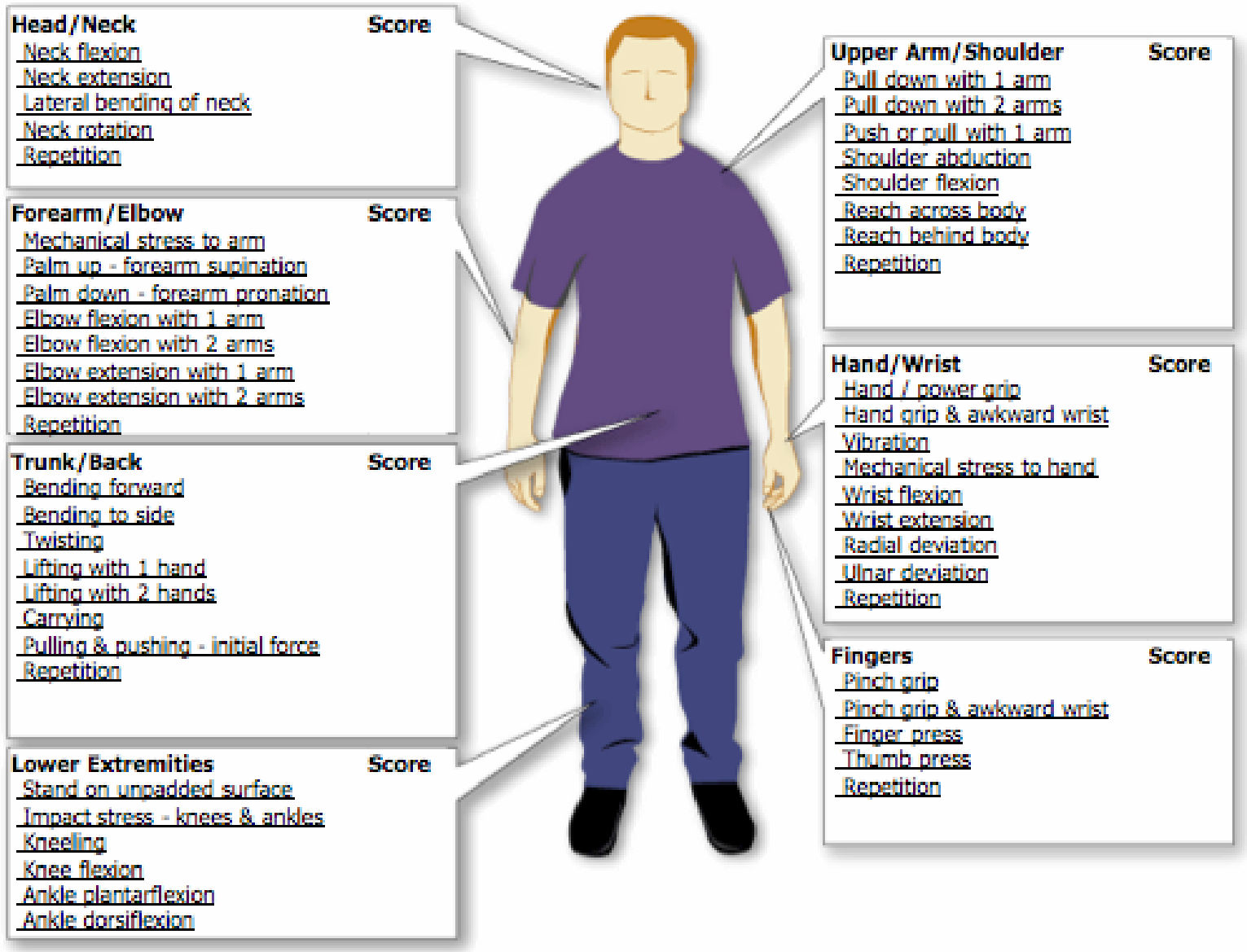


Upper Arm
&
Shoulder

Hand
&
Wrist

Fingers

Ergo Job Analyzer (EJA) Quantifies



EJA Data Collection Sheet

EJA DATA COLLECTION SHEET 1

Job: Date:

Neck flexion N/A Comment #
Posture (°):_____
Daily count:____
Daily Duration (min):_____

Neck extension N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Lateral bending of neck N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Neck rotation N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Neck repetition N/A Comment #
Daily count:____

Mechanical stress to arm N/A Comment #
Daily count:____ Side: E R L B
Force duration (min):_____
Force/Edge rating: H M L
(See p. 3 for Rating Definitions)

Palm up – forearm supination N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Palm down – forearm pronation N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Elbow flexion N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____

Elbow extension N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____

Elbow repetition N/A Comment #
Daily count:____

Pull down N/A Comments #
Two arms One arm
Force (lbs):____ Side: E R L
Daily count:____

Push or pull with one arm N/A Comment #
Force (lbs):____ Side: E R L
Daily count:____

Shoulder abduction N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Shoulder Flexion N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Reach across body N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Reach behind body N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily duration (min):_____

Shoulder repetition N/A Comment #
Daily count:____

Pinch grip N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____
Flexion Extension Radial Ulnar
Wrist posture (°):_____
Hold time (sec.): _____

Finger press N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____
Hold time (sec.):_____

Thumb press N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____
Hold time (sec.): _____

Fingers repetition N/A Comment #
Daily count:____

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EJA DATA COLLECTION SHEET 2

Job: Date:

Bending forward N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Bending to side N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Twisting N/A Comment #
Posture (°):_____
Daily count:____
Daily duration (min):_____

Lifting with both hands N/A Comment #
Weight (lbs):_____
Daily count:_____
Zone:_____

Lifting with one hand N/A Comment #
Weight (lbs):___ Side: E R L B
Daily count:_____
Zone:_____ Standing Sitting

Carrying N/A Comment #
Weight (lbs):_____
Distance:____ Daily count:____
Arms: Straight Bent

Pulling & Pushing – initial force N/A Comment #
Force (lbs):_____
Daily count:_____

Trunk repetition N/A Comment #
Daily count:____

Hand power grip N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____
Flexion Extension Radial Ulnar
Wrist posture (°):_____
Hold time (sec.): _____

Vibration N/A Comment #
Duration (min):____
Side: E R L B

Mechanical stress on hand N/A Comment #
Daily count:____ Side: E R L B
Force duration (min):_____
Force/Edge rating: H M L
(See p. 3 for Rating Definitions)

Wrist flexion N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily Duration (min):_____

Wrist extension N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily Duration (min):_____

Wrist radial deviation N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily Duration (min):_____

Wrist ulnar deviation N/A Comment #
Posture (°):____ Side: E R L B
Daily count:____
Daily Duration (min):_____

Hand/Wrist repetition N/A Comment #
Daily count:____

Stand on unpadded surface N/A Comment #
Daily duration (min):_____
Walking duration (min):_____

Impact stress – knees and ankles N/A Comment #
Daily count:____
Stepping down height: _____

Kneeling N/A Comment #
Daily duration (min):_____
Side: E R L B
Surface/Couplings: G F P
(See p. 3 for Rating Definitions)

Squatting N/A Comment #
Posture (°):_____
Daily duration (min):_____

Ankle plantarflexion N/A Comment #
Force (lbs):____ Side: E R L B
Daily count:____

Static ankle dorsiflexion N/A Comment #
Daily duration (min):_____

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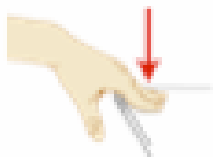
EJA Data Collection Sheet - Fingers

Pinch grip 	N/A Comment # Force (lbs):____ Side: E R L B Daily count:_____ Flexion Extension Radial Ulnar Wrist posture (°):_____ Hold time (sec.): _____
Finger press 	N/A Comment # Force (lbs):____ Side: E R L B Daily count:_____ Hold time (sec.):_____
Thumb press 	N/A Comment # Force (lbs):____ Side: E R L B Daily count:_____ Hold time (sec.): _____
Fingers repetition	N/A Comment # Daily count:_____

Pinch Grip Force

Max. Force: Total Count/Workday: Activities:

RISK RATING			
Total Count Per Workday	**Force (in lbs.)**		
	High	**Mod**	**Low**
1 - 10	>20	17 - 20	12 - 16
11 - 100	>10	9 - 10	6 - 8
101 - 500	>6	5.1 - 6	3.5 - 5
501 - 2000	>4	3.3 - 4	2.5 - 3.2
2001 - 5000	>3	2.6 - 3	1.7 - 2.5

Pinch Grip Force

- Ask employee to grip tool and perform task, then ask employee to grip dynamometer with same force.
- Use 5 trials, discard highest and lowest, then average middle three.